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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/007,890	11/09/2001	David W. Wang	60617.300801	3655

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INTELLECTUAL PROPERTY LAW OFFICE
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EXAMINER

CONNELLY CUSHWA, MICHELLE R

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 09/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

10/007,890

Applicant(s)

WANG ET AL.

Examiner

Michelle R. Connelly-Cushwa

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-19 and 23-31 is/are rejected.
- 7) ☒ Claim(s) 20-22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's Amendment filed June 23, 2003 has been fully considered and entered.

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on February 14, 2003 have all been considered and made of record (note the attached copy of form PTO-1449).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 4, 5, 7-10, 17, 18 and 23-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Grann et al. (US 6,212,312 B1).

Regarding claims 1, 2, 4, 17, 18 and 23; In Figure 1, Grann et al. discloses an optical grating comprising:

- a background region (11) of a first material having a first refractive index (n_2); and
- a grid of cells (12) within the background region;

- wherein the cells (12) are of a second material (13) having a second refractive index (n_1); and
- wherein the grid is two-dimensional, thereby making the optical grating a planar grating; and

Figure 3 of Grann et al. discloses an optical grating (20) comprising:

- an array of the optical gratings disclosed in Figure 1;
- a plurality of cells forming each planar grating in the array of optical gratings;
- the plurality of cells each having at least one incident surface; and
- the plurality of cells each having opposed surfaces, respective to the incident surfaces;
- wherein the plurality of cells each have at least one incident surface pitched such that, when the optical grating receives a light beam, first portions thereof *may* strike the incident surfaces, enter the cell, travel to the opposed surfaces, be reflected therefrom, travel back to the incident surfaces, and exit the cell as refracted beams, and/or second portions thereof *may* strike the incident surfaces and be reflected therefrom as reflected beams;
- wherein the grid formed by the array of optical gratings of Figure 1 is three-dimensional, thereby making a cubical grating; and
- wherein the planar gratings receive/transmit light of multiple wavelengths in one direction and output light of one particular

wavelength in a second direction, and are therefore, optically two-dimensional.

Regarding claims 5, 7 and 8; the plurality of cells forming each planar grating (interference filter) each have a set of surface-to-surface and a set of cell-to-cell separations that constructively interfere for a pre-determined light wavelength when it is present in the light beam (see Figure 3), and the incident surfaces and respective opposed surfaces have surface-to-surface optical separations such that the reflected and refracted beams will constructively interfere for a light wavelength when it is present in the light beam, wherein the plurality of cells have cell-to-cell separations such that the reflected beams will also constructively interfere for the light wavelength.

Regarding claims 9, 10, 24 and 25; the planar gratings receive/transmit light of multiple wavelengths in one direction and output light of one particular wavelength in a second direction, and are therefore, optically two-dimensional. And, the plurality of cells forming each planar grating (interference filter) each have a set of surface-to-surface and set of cell-to-cell separations that constructively interfere for a pre-determined light wavelength when it is present in the light beam (see Figure 3). Thus,

- the cells forming the first planar grating (10a) have a first set of surface-to-surface and a first set of cell-to-cell separations such that constructive interference occurs for a first pre-determined light wavelength (λ_1) when it is present in the light beam; and
- the cells forming the second planar grating (10b) have a second set of surface-to-surface separations and a second set of cell-to-cell

separations such that constructive interference will occur for a second light wavelength (λ_2) when it is present in the light beam.

Claims 1, 3, 11-14, 17 and 26-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Allan et al. (US 2002/0070352 A1).

Regarding claims 1, 3, 17, 26, 30 and 31; Figure 1 of Allan et al. discloses a glass sample (14) having crystallites or spots of altered physical characteristics (16) formed in a pattern therein. In paragraph [0034], Allan et al. discloses that the spots of altered physical characteristics can be voids or bubbles having a refractive index of one. In paragraphs [0036] and [0037], Allan et al. discloses that the present invention allows fabrication of a three-dimensional periodic array of regions, wherein the periodic array of regions includes regions of altered index of refraction to create an optical element such as a three-dimensional Bragg grating, wherein periodic variation may be in one, two, or three dimensions. Thus, Allan et al. discloses an optical grating comprising:

- a background region (14) of a first material (glass) having a first refractive index;
- a grid of cells (16) within the background region wherein the cells are of a second material (voids or bubbles) having a second refractive index;
- wherein the plurality of cells inherently have at least one incident surface and opposed surfaces, respective to the incident surfaces; and
- the incident surfaces are pitched such that, when the optical grating receives a light beam, first portions thereof may strike the incident

surfaces, enter the cell, travel to the opposed surfaces, be reflected therefrom, travel back to the incident surface, and exit the cell as refracted beams; and

- wherein the grid is inherently optically three-dimensional, thereby making the optical grating a cubical grating when the periodic variation is in three dimensions.

Regarding claims 11-14 and 27-29; the grid of voids or bubbles (16) is optically three dimensional when the periodic variation is in three dimensions, as disclosed by Allan et al. in paragraphs [0036] and [0037]; and

- the cells (voids or bubbles, 16) have a first set of surface-to-surface separations and a first set of cell-to-cell separations such that constructive interference will occur for a first light wavelength when it is present in the light beam;
- the cells further having a second set of surface-to-surface separations and a second set of cell-to-cell separations such that constructive interference will occur for a second light wavelength when it is present in the light beam; and
- the cells further having a third set of surface-to-surface separations and a third set of cell-to-cell separations such that constructive interference will occur for a third light wavelength when it is present in the light beam, hence forming a three-dimensional diffraction grating that combines the features of a planar two-dimensional diffraction

grating and a Bragg grating, which is based on Bragg's law for a specific light wavelength, as disclosed in paragraphs [0036] through [0037] of Allan et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grann et al. (US 6,212,312 B1).

Regarding claims 15, 16 and 19; Grann et al. discloses all of the limitations of these claims, except for the first and second materials being a specific material. One of ordinary skill in the art would have found it an obvious design choice to form the first and second materials from any well known materials, including Si, GaAs, SiO₂, etc., since such materials are well known and commonly used in the art and Grann et al. does not disclose that any specific materials are to be used.

Additionally, materials such as silicon are commonly used in both doped and undoped states in the art to form optical gratings. Therefore, one of ordinary skill in the art would have found it an obvious design choice to form the first and second materials from a base material, such as silicon, wherein one of the materials is altered by doping the silicon, since Grann et al. does not disclose that any specific materials are to be

used and both doped and un-doped silicon and other materials are well known and commonly used in the art to form optical gratings.

Allowable Subject Matter

Claims 20-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Claims 20-22 are allowable over the prior art of record for the reasons stated in the Office action mailed March 19, 2003 (paper No. 4).

Response to Arguments

Applicant's arguments filed June 23, 2003 have been fully considered but they are not persuasive.

Regarding prior art rejections to claims 1, 2, 9, 14, 17, 18, 23 and 24 under 35 U.S.C. 102(b) over Nichols et al. (EP 1 028 504 A1); independent claims 1 and 17 have been amended. The prior art rejections to claims 1, 2, 9, 14, 17, 18, 23 and 24 over Nichols et al. have been withdrawn in response to this amendment.

Regarding prior art rejections to claims 1-14, 17, 18 and 23-29 under 35 U.S.C. 102(e) over Grann et al. (US 6,212,312 B1) and to claims 15, 16 and 19 under 35 U.S.C. 103(a) over Grann et al. (US 6,212,312 B1); Applicant first argues that the

matter of dimensions has caused considerable confusion, although discussed throughout the specification, as on page 17, lines 21-26, which states:

"FIG. 11 is used next to summarize the one-dimensional (1D) or linear grating. FIG. 12 and 13 then help in an introduction illustrating that the principles of the one-dimensional (1D) or linear grating can be extended to provide a two-dimensional (2D), planar grating, and also a three-dimensional (3D), cubical grating. FIG. 14-17 support derivations extending the principles to the multidimensional, 2D and 3D cases. And FIG. 18-20 depict how gratings having multiple dimensions may have different optical properties relative to each such dimension."

Applicant further explains that when the present application speaks of dimensions it means optically active dimensions, and that while all of the grating occupy three physical dimensions, planar grating are able to operate on at least two optical dimensions by suitable choice of cell-to-cell and/or surface-to-surface spacing and cubical gratings are able to operate on three optical dimensions using cell-to-cell and/or surface-to-surface characteristics.

The planar gratings disclosed by Grann et al., however, are optically active in at least two dimensions as illustrated in Figure 3 of Grann et al, where a light beam is received/transmitted in one dimension and a particular wavelength present in the light beam is output in a second dimension.

Applicant second states that Grann et al. does not teach a grid of cells as the present application teaches.

A grid is defined as a "grating" (see Merriam-Webster's Collegiate Dictionary, 10th ed., page 512) and a grating is defined as "a partition, covering, or frame of parallel bars or crossbars" (see Merriam-Webster's Collegiate Dictionary, 10th ed., page 509). Therefore, when considering the ordinary definitions that one of ordinary skill in the art would have been familiar with, the planar gratings disclosed by Grann et al. are comprised of a grid of cells (see both Figures 1 and 3 of Grann et al.).

As noted in MPEP § 211, during patent examination, claims are given their broadest reasonable interpretation consistent with the specification. It is proper to use the specification to interpret what the applicant meant by a word or phrase recited in the claim. However it is not proper to read limitations appearing in the specification into the claim when these limitations are not recited in the claim. See *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2s 1671, 1674 (Fed. Cir. 1994); *Intervet America Inc. v. Kee-Vet Lab. Inc.*, 887 F.2d 1050, 1053, 12 USPQ2d 1474, 1476 (Fed. Cir. 1989).

Pursuant to 35 U.S.C. § 112, 2nd paragraph, the language of the claims must particularly point out and distinctly claim the subject matter that the applicant regards as the invention. Therefore, any specific physical structure or physical characteristics of the "grid of cells" of the present invention that distinguishes over the claimed grid of cells from an ordinary grid must be incorporated into the claims in order to distinguish the "grid of cells" of the present invention from the prior art.

Applicant third states that the invention of the present application can simultaneously route light in two directions based on cell-to-cell spacings and that the invention of Grann et al. clearly cannot route more than one light wavelength with any of

its individual grating filters and that Grann's 3D-physical construct is only optically relevant in one dimension.

Examiner disagrees. The invention of Grann et al. can transmit light of one wavelength in a first direction and reflect light of a second wavelength in a second direction (see Figure 3). Thus, the invention of Grann et al. can route more than one light wavelength within an individual grating filter. Therefore, the invention of Grann et al. is optically relevant in at least two dimensions.

Applicant fourth states that in view of how a "cubical grating" is defined in the present application, as on page 19, lines 7-27 and in Fig. 13, Grann et al. does not teach or reasonably suggest a cubical grating.

On page 19, lines 7-27 of the present application, the physical structure of Figure 13 is described, however, the claims of the present application do not define the specific structure or physical features of the "cubical grating" illustrated in Figure 13 that make the cubical grating "optically active" in three dimensions (*i.e. the cell-to-cell spacings and the surface-to-surface spacings that are controlled in two or more physical dimensions*). Examiner agrees, however, that Grann et al. does not specifically teach that the cubical grating disclosed in Figure 3 is "optically active" in three dimensions. Therefore, the rejections of claim 3, 11-13 and 26-28 in view of Grann et al. have been withdrawn.

Applicant fifth states that Grann et al. does not teach or reasonably suggest either first or second sets of surface-to-surface and cell-to-cell separations such that constructive interference occurs for either first or second light wavelengths.

Examiner disagrees. The rejections to claims 5, 24 and 25 have been reworded and discussed in more detail to clarify the rejection.

Applicant sixth states that Grann et al. teaches an optically 1D-active approach, able to handle only one light wavelength per separate grating filter and that Applicant claims a grid of cells able to handle up to six different light wavelengths concurrently all in the very same single 3D grid of cells. The invention disclosed in Figure 3 of Grann et al. is a single grid of cells formed from multiple planar gratings and, the invention can handle up to six or more different light wavelengths concurrently all in the single 3D grid of cells (see Figure 3).

Regarding prior rejection to claims 1-15, 17, 18 and 23-29 under 35 U.S.C. 102(e) over by Matsuda (US 6,404,947 B1); the rejections have been withdrawn.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (703) 305-5327. The examiner can normally be reached 9:00 AM to 7:00 PM, Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney B. Bovernick can be reached on 703-308-4819. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general or clerical nature should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956.

MRCC

Michelle R. Connelly-Cushwa
Patent Examiner
September 15, 2003


**AKM ENAYET ULLAH
PRIMARY EXAMINER**